

cartilage is needed for diagnosis, monitoring, and therapy control in osteoarthritis. In this study the accuracy of **three - dimensional cartilage volume and thickness measurements** in the knee with **magnetic resonance imaging** was analyzed. Eight cadaveric specimens had sagittal **imaging** with a fat suppressed gradient echo sequence. After a contrast agent was injected, two sagittal **computed tomography** data sets were obtained, with the knees being repositioned between the examinations. The **cartilage** thickness was determined, after **three - dimensional** reconstruction, using a minimal distance algorithm. The mean absolute volume deviation between **magnetic resonance imaging** and **computed tomography** arthrography was 3.3% and that between the two **computed tomography** data sets was 3.6%. The absolute error in determining the maximal **cartilage** thickness with **magnetic resonance imaging** was on average 0.6 intervals (of 0,5-mm thickness) and that between the **computed tomography** examinations was 0.5 intervals. In a patient with anterior knee pain, a focal **cartilage** defect was seen with **magnetic resonance imaging**, and this was verified by arthroscopic examination. Using **three - dimensional** image processing, **magnetic resonance imaging** can provide accurate data on **cartilage** volume and thickness in the human knee joint surfaces, This **imaging** technique potentially may be valuable in the treatment of patients with joint disease.

15/5/15 (Item 2 from file: 34)

DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
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06874368 Genuine Article#: ZY465 Number of References: 29

Title: MR imaging of hyaline cartilage at 0.5 T: a quantitative and qualitative in vitro evaluation of three types of sequences

Author(s): vanderLinden E (REPRINT) ; Kroon HM; Doornbos J; Hermans J; Bloem JL

Journal: SKELETAL RADIOLOGY, 1998, V27, N6 (JUN), P297-305

ISSN: 0364-2348 Publication date: 19980600

Abstract: Objective. To identify an optimal pulse sequence for in vitro imaging of hyaline cartilage at 0.5 T.

Materials and methods. Twelve holes of varying diameter and depth were drilled in **cartilage** of two pig knees. These were submerged in saline and scanned with a 0.5-T MR system. Sixteen T1-weighted gradient echo (GE), two T2-weighted GE, and 16 fast spin echo sequences were used, by varying repetition time (TR), echo time (TE), flip angle (FA), echo train length, profile order, and by use of fat saturation. Contrast-to-noise ratios (CNR) of **cartilage** versus saline solution and **cartilage** versus subchondral bone were measured. **Cartilaginous** lesions were evaluated separately by three independent observers. Interobserver variability and correlation between the quantitative and qualitative analyses were calculated.

Results. The mean CNRs of two specimens of **cartilage** versus saline solution ranged from 6.3 (+/-2.1) to 27.7 (+/-2.5), and those of **cartilage** versus subchondral bone from 0.3 (+/-0.2) to 22.5 (+/-1.4). The highest CNR was obtained with a T1-weighted spoiled 3D -GE technique (TR 65 ms, TE 11.5 ms, FA 45 degrees). The number of lesions observed per sequence varied from 35 to 69. Observer agreement was fair to good. The T1-weighted spoiled GE sequences with a TR of 65 ms, TE of

11.5 ms and FA of 30 degrees and 45 degrees were significantly superior to the other 34 sequences in the qualitative analysis.

Conclusion. T1-weighted spoiled 3D -GE sequences with a TR of 65 ms, a TE of 11.5 ms, and a FA of 30-45 degrees were found to be optimal for in vitro imaging of cartilage at 0.5 T.

15/5/16 (Item 3 from file: 34)

DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
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06831934 Genuine Article#: ZV355 Number of References: 41

Title: Quantitative MR imaging evaluation of chondropathy in osteoarthritic knees

Author(s): Drape JL (REPRINT) ; Pessis E; Auleley GR; Chevrot A; Dougados M ; Ayral X

Journal: RADIOLOGY, 1998, V208, N1 (JUL), P49-55

ISSN: 0033-8419 Publication date: 19980700

Abstract: PURPOSE: To determine the validity and the reliability of T1-weighted three - dimensional gradient-echo magnetic resonance (MR) imaging for quantification of articular cartilage abnormalities of osteoarthritic knees.

MATERIALS AND METHODS: Forty-three patients (mean age, 63 years) with knee osteoarthritis (American College of Rheumatology criteria) of the medial tibiofemoral compartment underwent a prospective, cross-sectional study. Knees were examined with a T1-weighted three - dimensional gradient-echo sequence (1.4-mm contiguous sections), with use of a 0.2-T dedicated MR unit, before arthroscopic exploration. The tibiofemoral articular cartilage abnormalities were quantified blindly on both the MR and arthroscopic images with the French Society of Arthroscopy (SFA) score (0-100) and grading scheme (five grades).

RESULTS: There was a statistically significant correlation between the SFA-arthroscopic score and the SFA- MR score ($r = .83$) and between the SFA-arthroscopic grade and the SFA- MR grade (weighted kappa = 0.84). The deepest cartilage lesions graded with arthroscopy and MR imaging showed correlation in the medial femoral condyle (weighted kappa = 0.83) and in the medial tibial plateau (weighted kappa = 0.84). The intraobserver reliability of the SFA- MR score was higher ($r = .94$) than the interobserver reliability ($r = .80$).

CONCLUSION: Quantification of chondropathy with MR imaging is feasible and well correlated with anatomic cartilage breakdown.

Descriptors--Author Keywords: arthroscopy ; cartilage ; cartilage, MR ; knee, arthritis ; magnetic resonance (MR), comparative studies ; magnetic resonance (MR), volume measurement

15/5/17 (Item 4 from file: 34)

DIALOG(R) File 34:SciSearch(R) Cited Ref Sci
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06515531 Genuine Article#: YY262 Number of References: 33

Title: In vivo reproducibility of three - dimensional cartilage volume and thickness measurements with MR imaging

13547173 PASCAL No.: 98-0248275

An MR -based technique for quantifying the deformation of articular cartilage during mechanical loading in an intact cadaver joint

HERBERHOLD C; STAMMBERGER T; FABER S; PUTZ R; ENGLMEIER K H; REISER M; ECKSTEIN F

Journal: Magnetic resonance in medicine, 1998, 39 (5) 843-850

ISSN: 0740-3194 CODEN: MRMEEN Availability: INIST-20644;
354000075823810210

The objective of this study was to develop an MR -based technique for quantifying the deformation of articular **cartilage** during mechanical loading in an intact cadaver joint at high spatial and temporal resolution. A nonmetallic pressure device was constructed for applying loads of >1000 N to a femoro-patellar articulation within an extremity coil of a clinical 1.5 T **MRI** scanner. Digital image processing methods were used to determine the location- and **time** -dependent **cartilage** deformation in consecutive 2D fat-suppressed FLASH images. Additionally, **three - dimensional** reconstruction of the **cartilage** was performed from 3D fat-suppressed FLASH image data. During the first 10 min of static compression, thickness changes between 10 and 30% were observed. Thickness changes greater than 50% and volume changes of 20% were recorded after 3 h. The technique permits analysis of the load and **time** -dependent mechanical behavior of articular **cartilage** in its natural environment.

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15/5/27 (Item 1 from file: 155)

DIALOG(R) File 155:MEDLINE(R)

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11570140 99001797 PMID: 9785618

Relevance of susceptibility-induced geometrical distortion for validity of MRI -based cartilage volume and density measurements of the knee joint]

Relevanz suszeptibilitätsinduzierter geometrischer Fehlkodierungen für die Validität MR -basierter Knorpelvolumen- und -dickenmessungen im Kniegelenk.

Schnier M; Priebisch J; Faber S; Haubner M; Glaser C; Englmeier K H; Reiser M; Eckstein F

Biomedizinische Technik. Biomedical engineering (GERMANY) Sep 1998, 43 (9) p243-8, ISSN 0013-5585 Journal Code: 1262533

Languages: GERMAN

The aim of the present study was to analyze the relevance of susceptibility-induced geometrical distortion to the accuracy of MR -based **cartilage** volume and thickness measurement in the human knee joint. Nine cadaveric knee joints were imaged in the sagittal plane with **MRI** at a resolution of 2 x 0.31 x 0.31 mm³, using a fat-suppressed gradient echo sequence, with a normal gradient orientation and also with the frequency- and phase-encoding directions changed. CT arthrographic data sets were then obtained. On the basis of 3 - D constructions, we determined the **cartilage** volume and, with a 3 - D minimal distance algorithm, the thickness distribution, of the patella, femur and tibia. Irrespective of the gradient orientation, good agreement was observed between **MRI** and CT arthrography in terms of **cartilage** volumes and maximum **cartilage** thickness. With a normal gradient orientation the volume was overestimated by 2.5% in **MRI**, and 2.3% when the gradients were changed. The maximum **cartilage** thickness was underestimated by 0.24 intervals (interval =

50
261
621